

**Remarks**

The Office Action mailed December 19, 2005 has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 1-15 and 17-26 are now pending in this application. Claims 1-26 are rejected. Claim 16 has been canceled without prejudice, waiver, or disclaimer. Claims 1, 2, 4, 5, 9, 18, and 22 have been amended. No new matter has been added.

The rejection of Claims 1-6 and 9-15 under 35 U.S.C. § 102(b) as being anticipated by Jago (U.S. Patent No. 6,547,732) is respectfully traversed.

Jago describes an adaptive image processing system for spatial compounding. In an obstetrical exam, a clinician may be trying to discern soft tissue which is adjacent to strongly reflective bone in a fetus (column 5, lines 12-14). In a breast exam, the clinician may be trying to locate tumors by discerning their acoustic shadowing in an image (column 5, lines 15-16). Thus, rather than trying to suppress acoustic shadowing, the spatial compounding is used to enhance this characteristic (column 5, lines 17-19).

Claim 1 recites a method of medical ultrasonic imaging comprising “transmitting ultrasonic waves into a volume at different steering angles; receiving ultrasonic echoes for each of the ultrasonic waves, each ultrasonic echo being indicative of a density interface within the volume, said ultrasonic echoes being organized into steering frames; identifying a distal shadow within at least one of said steering frames; combining said steering frames into a compound image; and identifying an area of substantially orthogonal echo reflection from a density interface in one of the steering frames.”

Jago does not describe or suggest a method of medical ultrasonic imaging as recited in Claim 1. Specifically, Jago does not describe or suggest identifying an area of substantially orthogonal echo reflection from a density interface in one of the steering frames. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Accordingly, Jago does not describe or suggest

identifying an area of substantially orthogonal echo reflection as recited in Claim 1. For the reasons set forth above, Claim 1 is submitted to be patentable over Jago.

Claims 2-6 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2-6 are considered in combination with the recitations of Claim 1, Applicant submits that Claims 2-6 likewise are patentable over Jago.

Claim 9 recites an ultrasound system, comprising “a transmitter for transmitting ultrasonic waves into a volume at different steering angles; a receiver for receiving ultrasonic echoes for each of said ultrasonic waves, each said ultrasonic echo being indicative of a density interface within the volume, said ultrasonic echoes being organized into steering frames; a signal processor identifying a distal shadow in each steering frame, said signal processor combining said steering frames into a compound image; and a display for outputting information based on said identified distal shadows, wherein said system backcalculates echo reflection data to identify a source of the distal shadow.”

Jago does not describe or suggest an ultrasound system as recited in Claim 9. Specifically, Jago does not describe or suggest the system backcalculates echo reflection data to identify a source of the distal shadow. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Accordingly, Jago does not describe or suggest backcalculating echo reflection data as recited in Claim 9. For the reasons set forth above, Claim 9 is submitted to be patentable over Jago.

Claims 10-15 depend, directly or indirectly, from independent Claim 9. When the recitations of Claims 10-15 are considered in combination with the recitations of Claim 9, Applicant submits that Claims 10-15 likewise are patentable over Jago.

For at least the reasons set forth above, Applicant respectfully requests that the Section 102 rejection of Claims 1-6 and 9-15 be withdrawn.

The rejection of Claims 2-3 and 9-11 under 35 U.S.C. § 103(a) as being unpatentable over Jago in view of Guracar et al. (U.S. Patent No. 6,858,010) is respectfully traversed.

Jago is described above. Guracar et al. describe a marker processor (30) that is operable to identify one or more markers, such as brightness and shadow (column 6, lines 27-28, 46-48). For example, one or more regions associated with filtered data output by a low pass filter are identified as a marker (column 6, lines 28-30).

Thresholding, gradient processing or other algorithms identify the markers (column 6, lines 30-31). The markers are identified in an act (44) and highlighted in an act (46) (column 10, lines 19-20). A correction frame of data includes marker information (column 10, line 55). While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames (column 10, lines 41-44). For example, three-way steered spatial compounding is provided (column 10, lines 44-45).

Claims 2-3 depend, directly or indirectly, from independent Claim 1 which is recited above.

Neither Jago nor Guracar et al., considered alone or in combination, describe or suggest a method of medical ultrasonic imaging as recited in Claim 1. Specifically, neither Jago nor Guracar et al., considered alone or in combination, describe or suggest identifying an area of substantially orthogonal echo reflection from a density interface in one of the steering frames. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Guracer et al. describe identifying and highlighting a marker, such as brightness and shadow. A correction frame of data includes the marker information. While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames. Accordingly, neither Jago nor Guracar et al., considered alone or in combination, describe or suggest identifying an area of substantially orthogonal echo reflection as recited in Claim 1. For the reasons set forth above, Claim 1 is submitted to be patentable over Jago in view of Guracar et al.

When the recitations of Claims 2-3 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2-3 likewise are patentable over Jago in view of Guracar et al.

Claims 10 and 11 depend, directly or indirectly, from independent Claim 9 which is recited above.

Neither Jago nor Guracar et al., considered alone or in combination, describe or suggest an ultrasound system as recited in Claim 9. Specifically, neither Jago nor Guracar et al., considered alone or in combination, describe or suggest the system backcalculates echo reflection data to identify a source of the distal shadow. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Guracer et al. describe identifying and highlighting a marker, such as brightness and shadow. A correction frame of data includes the marker information. While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames. The highlighting described in Guracer et al. does not teach backcalculating echo reflection data as recited in Claim 9. Accordingly, neither Jago nor Guracar et al., considered alone or in combination, describe or suggest backcalculating echo reflection data as recited in Claim 9. For the reasons set forth above, Claim 9 is submitted to be patentable over Jago in view of Guracar et al.

When the recitations of Claims 10-11 are considered in combination with the recitations of Claim 9, Applicant submits that dependent Claims 10-11 likewise are patentable over Jago in view of Guracar et al.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 2-3 and 9-11 be withdrawn.

The rejection of Claims 7 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Jago in view of Guracar et al., and further in view of Li (U.S. Patent No. 5,582,173) is respectfully traversed.

Jago and Guracar et al. are described above. Li describes a van Cittert-Zernicke theorem. The theorem states that a correlation decreases with an increasing distance  $d$  between two frames used to determine correlation (column 9, lines 35-38).

Claim 7 depends from independent Claim 1 which is recited above.

None of Jago, Guracar et al., or Li, considered alone or in combination, describe or suggest a method of medical ultrasonic imaging as recited in Claim 1. Specifically, none of Jago, Guracar et al., or Li, considered alone or in combination, describe or suggest identifying an area of substantially orthogonal echo reflection from a density interface in one of the steering frames. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Guracer et al. describe identifying and highlighting a marker, such as brightness and shadow. A correction frame of data includes the marker information. While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames. Li describes decreasing of a correlation with an increasing distance  $d$  between two frames. Accordingly, none of Jago, Guracar et al., or Li, considered alone or in combination, describe or suggest identifying an area of substantially orthogonal echo reflection as recited in Claim 1. For the reasons set forth above, Claim 1 is submitted to be patentable over Jago in view of Guracar et al., and further in view of Li.

When the recitations of Claim 7 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claim 7 likewise is patentable over Jago in view of Guracar et al., and further in view of Li.

Claim 16 has been canceled.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 7 and 16 be withdrawn.

The rejection of Claims 7-8 and 16-17 under 35 U.S.C. § 103(a) as being unpatentable over Jago in view of Tirumalai et al. (U.S. Patent No. 6,872,181), and further in view of Li is respectfully traversed.

Jago and Li are described above.

Tirumalai et al. describe a compound display image system and method. In the system, a plurality of frames of data may be processed differently for data to be used for estimating motion and data used for compounding (column 10, lines 49-51). Moreover, in the system a plurality of areas associated with scanned features, such as shadowed regions or tissue features, may be identified and emphasized for estimating motion (column 10, lines 50-53).

Claims 7 and 8 depend from independent Claim 1 which is recited above.

None of Jago, Tirumalai et al., or Li, considered alone or in combination, describe or suggest a method of medical ultrasonic imaging as recited in Claim 1. Specifically, none of Jago, Tirumalai et al., or Li, considered alone or in combination, describe or suggest identifying an area of substantially orthogonal echo reflection from a density interface in one of the steering frames. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Tirumalai et al. describe identifying a plurality of areas associated with scanned features, such as, shadowed regions or tissue features. Li describes decreasing of a correlation with an increasing distance  $d$  between two frames. Accordingly, none of Jago, Tirumalai et al., or Li, considered alone or in combination, describe or suggest identifying an area of substantially orthogonal echo reflection as recited in Claim 1. For the reasons set forth above, Claim 1 is submitted to be patentable over Jago in view of Tirumalai et al., and further in view of Li.

When the recitations of Claims 7 and 8 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 7 and 8 likewise are patentable over Jago in view of Tirumalai et al., and further in view of Li.

Claim 16 has been canceled. Claims 17 depends from independent Claim 9 which is recited above.

None of Jago, Tirumalai et al., or Li, considered alone or in combination, describe or suggest an ultrasound system as recited in Claim 9. Specifically, none of

Jago, Tirumalai et al., or Li, considered alone or in combination, describe or suggest the system backcalculates echo reflection data to identify a source of the distal shadow. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Tirumalai et al. describe identifying a plurality of areas associated with scanned features, such as, shadowed regions or tissue features. Li describes decreasing of a correlation with an increasing distance  $d$  between two frames. Accordingly, none of Jago, Tirumalai et al., or Li, considered alone or in combination, describe or suggest backcalculating echo reflection data as recited in Claim 9. For the reasons set forth above, Claim 9 is submitted to be patentable over Jago in view of Tirumalai et al., and further in view of Li.

When the recitations of Claim 17 are considered in combination with the recitations of Claim 9, Applicant submits that dependent Claim 17 likewise is patentable over Jago in view of Tirumalai et al., and further in view of Li.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 7 and 16 be withdrawn.

The rejection of Claims 18-25 under 35 U.S.C. § 103(a) as being unpatentable over Jago in view of Guracar et al. is respectfully traversed.

Jago and Guracar et al. are described above.

Claim 18 recites a computer program embodied on a computer readable medium for controlling medical ultrasonic imaging comprising, the program comprising a code segment that receives user selection input data and then “transmits ultrasonic waves into a volume at different steering angles; receives ultrasonic echoes for each of the transmitted ultrasonic waves, each received echo being indicative of a density interface within the volume, each ultrasonic echo being organized into steering frames; identifies distal shadows in each steering frame; combines steering frames into a spatially compounded image; and identifies an area of substantially orthogonal echo reflection from a density interface in one of the steering frames.”

Neither Jago nor Guracar et al., considered alone or in combination, describe or suggest a computer program as recited in Claim 18. Specifically, neither Jago nor Guracar et al., considered alone or in combination, describe or suggest a computer program that identifies an area of substantially orthogonal echo reflection from a density interface in one of the steering frames. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Guracer et al. describe identifying and highlighting a marker, such as brightness and shadow. A correction frame of data includes the marker information. While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames. Accordingly, neither Jago nor Guracar et al., considered alone or in combination, describe or suggest a computer program that identifies an area of substantially orthogonal echo reflection as recited in Claim 18. For the reasons set forth above, Claim 18 is submitted to be patentable over Jago in view of Guracar et al.

Claims 19-25 depend, directly or indirectly, from independent Claim 18. When the recitations of Claims 19-25 are considered in combination with the recitations of Claim 18, Applicant submits that dependent Claims 19-25 likewise are patentable over Jago in view of Guracar et al.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 18-25 be withdrawn.

The rejection of Claim 26 under 35 U.S.C. § 103(a) as being unpatentable over Jago and Guracar et al., and further in view of Tirumalai et al. and Li is respectfully traversed.

Jago, Guracar et al., Tirumalai et al., and Li are described above.

Claim 26 depends from independent Claim 18 which is recited above.

None of Jago, Guracar et al., Tirumalai et al., or Li, considered alone or in combination, describe or suggest a computer program as recited in Claim 18. Specifically, none of Jago, Guracar et al., Tirumalai et al., or Li, considered alone or

in combination, describe or suggest a computer program that identifies an area of substantially orthogonal echo reflection from a density interface in one of the steering frames. Rather, Jago describes locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Guracer et al. describe identifying and highlighting a marker, such as brightness and shadow. A correction frame of data includes the marker information. While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames. Tirumalai et al. describe identifying a plurality of areas associated with scanned features, such as, shadowed regions or tissue features. Li describes decreasing of a correlation with an increasing distance  $d$  between two frames. Accordingly, none of Jago, Guracar et al., Tirumalai et al., or Li, considered alone or in combination, describe or suggest a computer program that identifies an area of substantially orthogonal echo reflection as recited in Claim 18. For the reasons set forth above, Claim 18 is submitted to be patentable over Jago and Guracar et al., and further in view of Tirumalai et al. and Li.

When the recitations of Claim 26 are considered in combination with the recitations of Claim 18, Applicant submits that dependent Claim 26 likewise is patentable over Jago and Guracar et al., and further in view of Tirumalai et al. and Li.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 26 be withdrawn.

Moreover, Applicant respectfully submits that the Section 103 rejections of Claims 2-3, 7-11, and 16-26 are not proper rejections. As is well established, obviousness cannot be established by combining the teachings of the cited art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. None of Jago, Guracar et al., Tirumalai et al., or Li, considered alone or in combination, describe or suggest the claimed combination. Furthermore, in contrast to the assertion within the Office Action, Applicant respectfully submits that it would not be obvious to one skilled in the art to combine Jago with Guracar et al., Tirumalai et al., or Li because there is no motivation to combine the references suggested in the cited art itself.

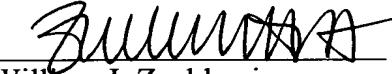
As the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicant's disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejection is based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention. Specifically, Jago teaches locating, by a clinician, in a breast exam, a plurality of tumors by discerning an acoustic shadowing of the tumors in an image. Rather than trying to suppress the acoustic shadowing, spatial compounding is used to enhance the acoustic shadowing. Guracer et al. teach identifying and highlighting a marker, such as brightness and shadow. A correction frame of data includes the marker information. While the correction frame is formed from one component frame, the correction frame may be formed from multiple component frames. Tirumalai et al. teach identifying a plurality of areas associated with scanned features, such as, shadowed regions or tissue features. Li teaches decreasing of a correlation with an increasing distance  $d$  between two frames. Since there is no teaching nor suggestion in the cited art for the combination, the Section 103 rejections appear to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicant requests that the Section 103 rejections of Claims 2-3, 7-11, and 16-26 be withdrawn.

For at least the reasons set forth above, Applicant respectfully requests that the rejections of Claims 2-3, 7-11, and 16-26 under 35 U.S.C. 103(a) be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

  
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